United States Department of Agriculture

Natural Resources Conservation Service

Arizona Basin Outlook Report March 1, 2005

Basin Outlook Reports and Federal - State - Private Cooperative Snow Surveys

For more water supply and resource management information, contact:
Larry P. Martinez
Water Supply Specialist
230 N. First Avenue, Suite 509
Phoenix, AZ 85003-1706
(602) 280-8841
Email: Larry.Martinez@az.usda.gov

How forecasts are made

Most of the annual streamflow in the western United States originates as snowfall that has accumulated in the mountains during the winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Measurements of snow water equivalent at selected manual snow courses and automated SNOTEL sites, along with precipitation and streamflow values are used in computerized statistical and simulation models to prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertain knowledge of future weather conditions, (2) uncertainty in the forecasting procedure, and (3) errors in the data. The forecast, therefore, must be interpreted not as a single value but rather as a range of values with specific probabilities of occurrence. The middle of the range is expressed by the 50% exceedance probability forecast, for which there is a 50% chance that the actual flow will be above, and a 50% chance that the actual flow will be below, this value. To describe the expected range around this 50% value, four other forecasts are provided, two smaller values (90% and 70% exceedance probability) and two larger values (30%, and 10% exceedance probability). For example, there is a 90% chance that the actual flow will be more than the 90% exceedance probability forecast. The others can be interpreted similarly.

The wider the spread among these values, the more uncertain the forecast. As the season progresses, forecasts become more accurate, primarily because a greater portion of the future weather conditions become known; this is reflected by a narrowing of the range around the 50% exceedance probability forecast. Users should take this uncertainty into consideration when making operational decisions by selecting forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected. If users anticipate receiving a lesser supply of water, or if they wish to increase their chances of having an adequate supply of water for their operations, they may want to base their decisions on the 90% or 70% exceedance probability forecasts, or something in between. On the other hand, if users are concerned about receiving too much water (for example, threat of flooding), they may want to base their decisions on the 30% or 10% exceedance probability forecasts, or something in between. Regardless of the forecast value users choose for operations, they should be prepared to deal with either more or less water. (Users should remember that even if the 90% exceedance probability forecast is used, there is still a 10% chance of receiving less than this amount.) By using the exceedance probability information, users can easily determine the chances of receiving more or less water.

ARIZONA
Water Supply Outlook Report
as of March 1, 2005

A full range of Snow Survey and Water Supply Forecasting products is available on the Arizona NRCS Home Page

Arizona Snow Survey Program
http://www.az.nrcs.usda.gov/snow/index.html

Helpful Internet Sites

Defending Against Drought – NRCS
http://www.nrcs.usda.gov/feature/highlights/drought.html
- **Ideas on water, land, and crop management for you to consider while creating your drought plan.**

Arizona Agri-Weekly
http://www.nass.usda.gov/az/cur-agwk.pdf
- **Provides an overview of Arizona's crop, livestock, range and pasture conditions as reported by local staffs of the USDA's Agricultural Statistic Service and the University of Arizona, College of Agriculture.**

SUMMARY

Snow surveys conducted at the end of February show snowpack levels to be well above average for this time of year. As a result of these favorable conditions, the long range forecast calls for much above median streamflow levels through the snowmelt season and for significant improvement in reservoir storage on the Salt, Gila, and Little Colorado Rivers.

SNOWPACK

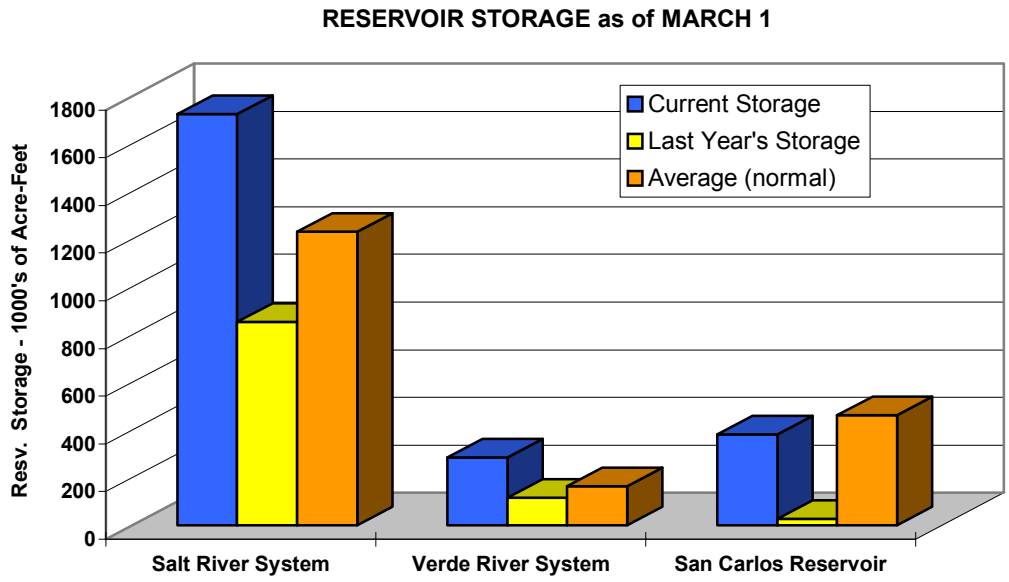
Watershed	Percent (%) of 30-Yr. Average Snowpack Levels as of March 1
Salt River Basin	129%
Verde River Basin	152%
Little Colorado River Basin	126%
San Francisco-Upper Gila River Basin	160%
Other Points of Interest	
Chuska Mountains	139%
Central Mogollon Rim	132%
Grand Canyon	136%
San Francisco Peaks	236%
Statewide Snowpack	152%

PRECIPITATION

High elevation NRCS SNOTEL sites recorded significant precipitation for the month of February. In the White Mountains, precipitation amounts ranged from 4.4 to 6.6 inches, while 13.7 inches was recorded in the Sierra Ancha at the Workman Creek SNOTEL site. In the Verde basin, precipitation amounts ranged from 8.7 inches near White Horse Lake to 7.5 inches at the Mormon Mountain SNOTEL site. Similar precipitation amounts were also recorded at SNOTEL sites located in the Little Colorado River Basin and along Central Mogollon Rim. In the San Francisco-Upper Gila River Basin, precipitation amounts ranged from 3.2 to 6.9 inches.

Please refer to the basin bar graphs found in this report for more information regarding seasonal precipitation amounts.

RESERVOIR



Key storage volumes displayed in thousands of acre-feet (1000 x):

RESERVOIR	CURRENT STORAGE	LAST YEAR STORAGE	30-YEAR AVERAGE
Lyman Lake	4.9	2.2	15.4
Show Low Lake	6.2	3.2	3.7
Lake Pleasant	813.4	659.7	----
Lake Havasu	613.4	556.5	552.4
Lake Mohave	1722.9	1715.6	1675.1
Lake Mead	15739.0	15404.0	22122.0
Lake Powell	8265.0	10569.0	18236.0
Salt River System	1724.8	853.8	1231.5
Verde River System	284.5	115.7	163.5
San Carlos Reservoir	381.5	27.2	461.4

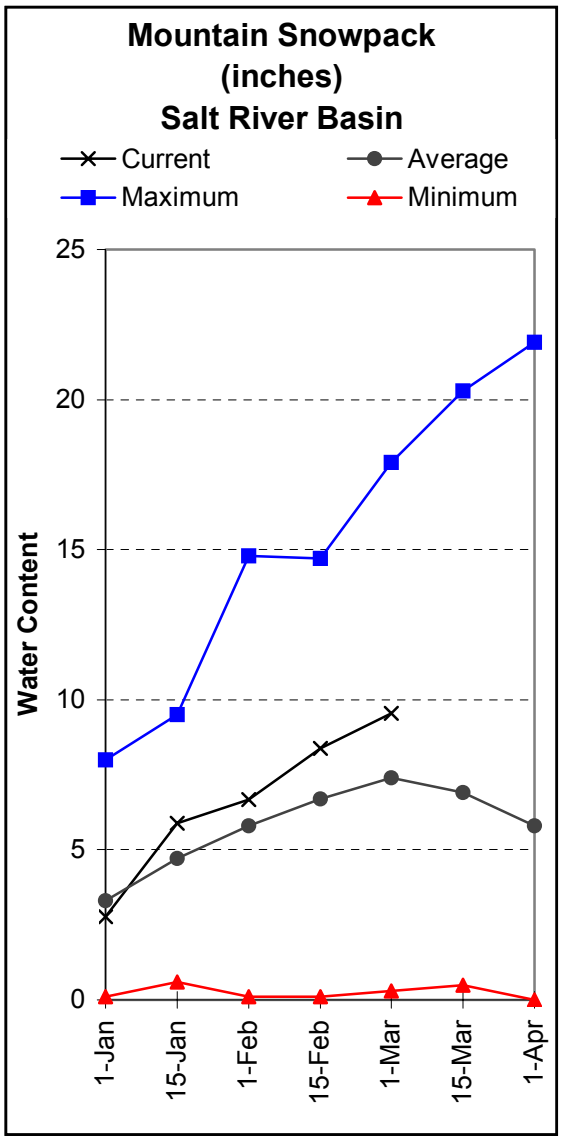
STREAMFLOW

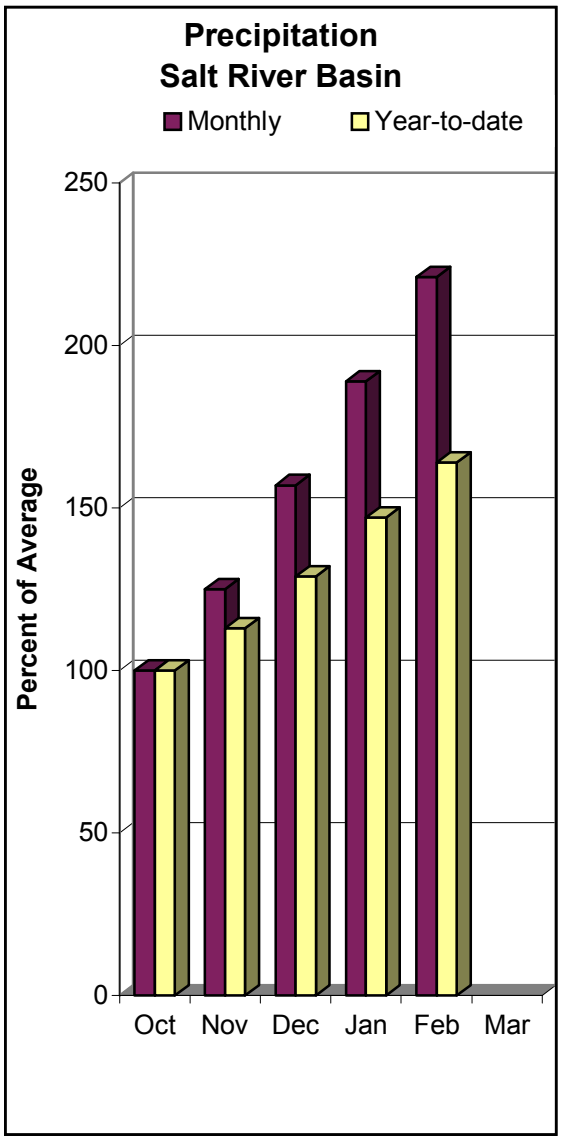
Much above median streamflow levels are forecast through the snowmelt season. Please refer to the basin forecast tables found in this report for more information regarding seasonal water supplies.

SALT RIVER BASIN as of March 1, 2005

Much above median streamflow levels are forecast for the basin. In the Salt River, near Roosevelt, the forecast calls for 185 % of median streamflow levels through MAY, while at Tonto Creek, the forecast calls for 231 % of median streamflow levels through MAY.

Snow survey measurements show the Salt snowpack to be 129 % of the 30-year average, while combined reservoir storage for the Salt River system stands at 1,724,819 acre-feet.





SALT RIVER BASIN
Streamflow Forecasts - March 1, 2005

Forecast Pt / Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions 50% (1000AF)	50% (% MED.)	=== Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Med (1000AF)
Salt River nr Roosevelt							
MAR-MAY	291	406	500	185	607	792	270
MARCH	89	143	180	137	217	270	131
Tonto Creek ab Gun Creek nr Roosevelt							
MAR-MAY	19.9	40	60	231	85	134	26
MARCH	22	33	40	237	47	58	16.9

* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average and median are computed for the 1971-2000 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural volume - actual volume may be affected by upstream water management.

SALT RIVER BASIN
Reservoir Storage (1000AF) End of February

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
SALT RIVER RES SYSTEM	2025.8	1724.8	853.8	1231.5

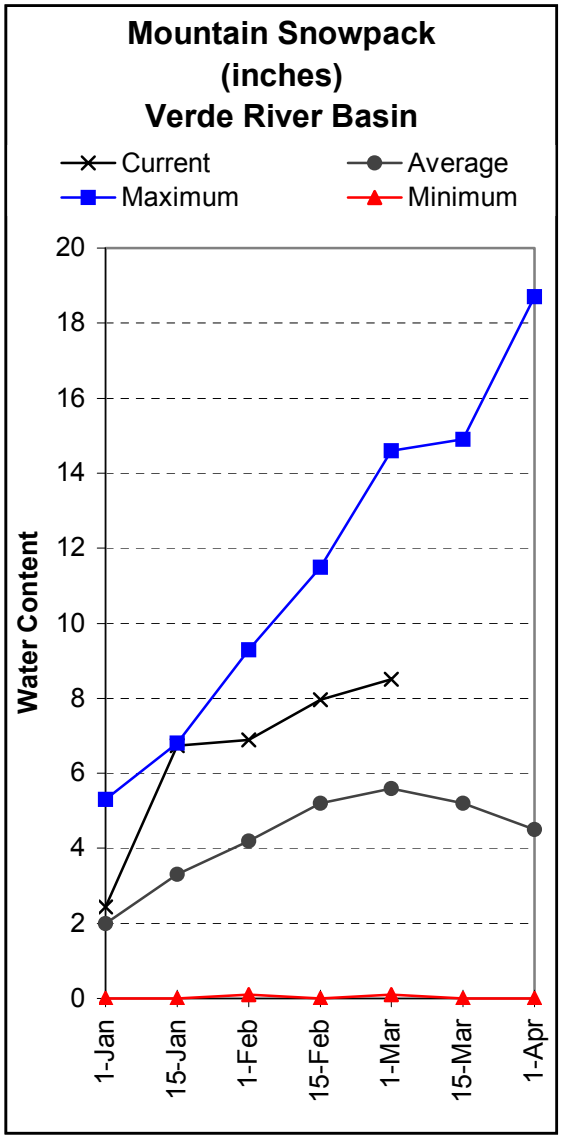
SALT RIVER BASIN
Watershed Snowpack Analysis - March 1, 2005

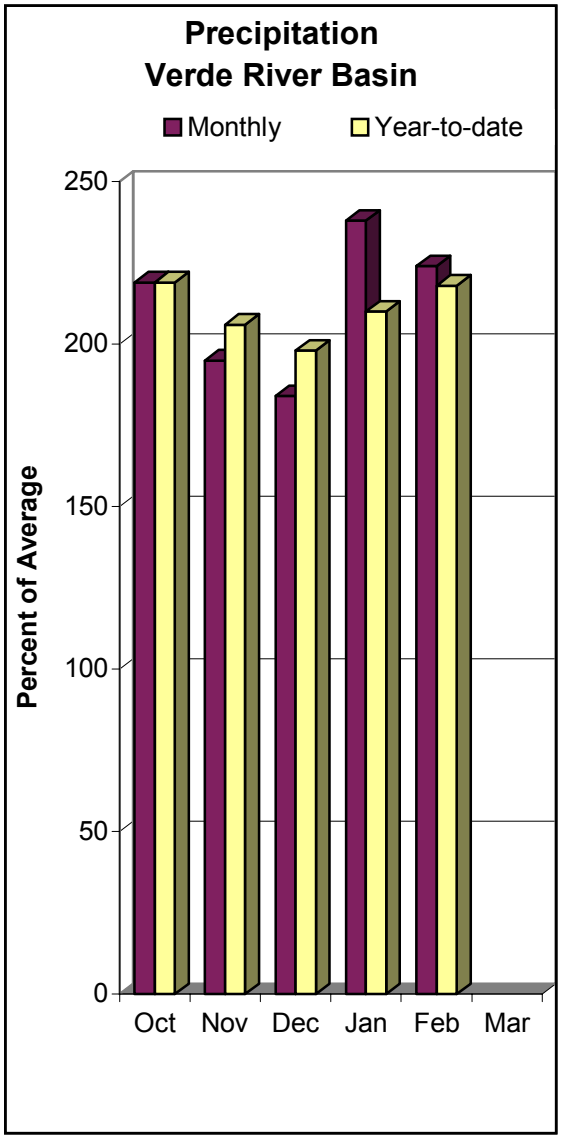
Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
SALT RIVER BASIN	8	177	129

VERDE RIVER BASIN as of March 1, 2005

Much above median streamflow levels are forecast for the basin. In the Verde River, at Horseshoe Dam, the forecast calls for 208 % of median streamflow levels through MAY.

Snow survey measurements show the Verde snowpack to be 152 % of the 30-year average, while combined reservoir storage for the Verde River system stands at 284,502 acre-feet.





VERDE RIVER BASIN
Streamflow Forecasts - March 1, 2005

Forecast Pt / Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions — Chance of Exceeding * — 50% (1000AF)	50% (% MED.)	=== Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Med (1000AF)
Verde River abv Horseshoe Dam							
MAR-MAY	153	233	300	208	379	519	144
MARCH	108	163	200	400	237	291	50

* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

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(2) - The value is natural volume - actual volume may be affected by upstream water management.

VERDE RIVER BASIN
Reservoir Storage (1000AF) End of February

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
VERDE RIVER RES SYSTEM	287.4	284.5	115.7	163.5

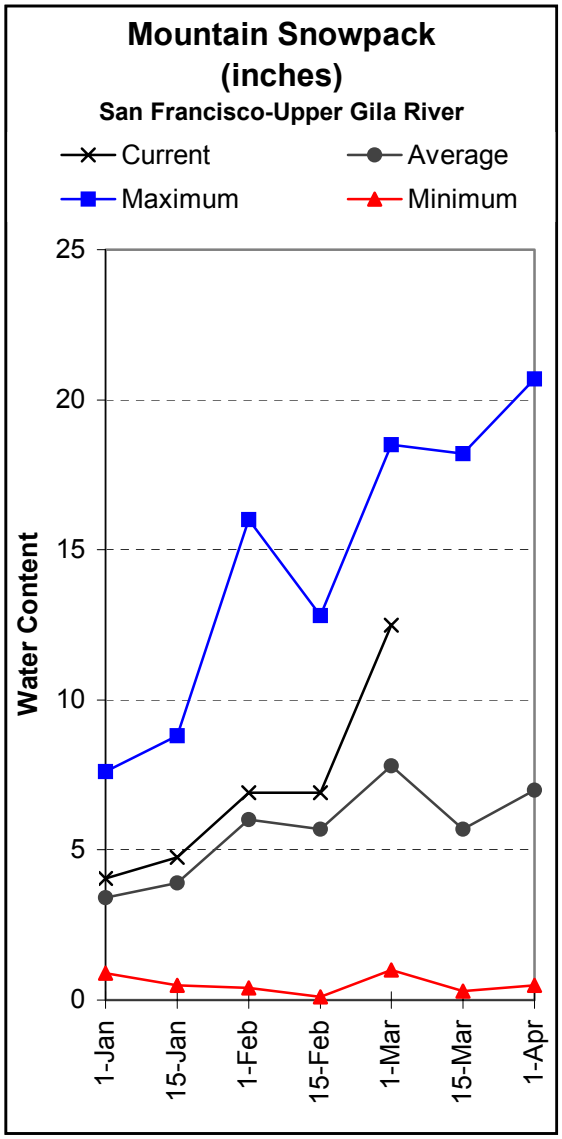
VERDE RIVER BASIN
Watershed Snowpack Analysis - March 1, 2005

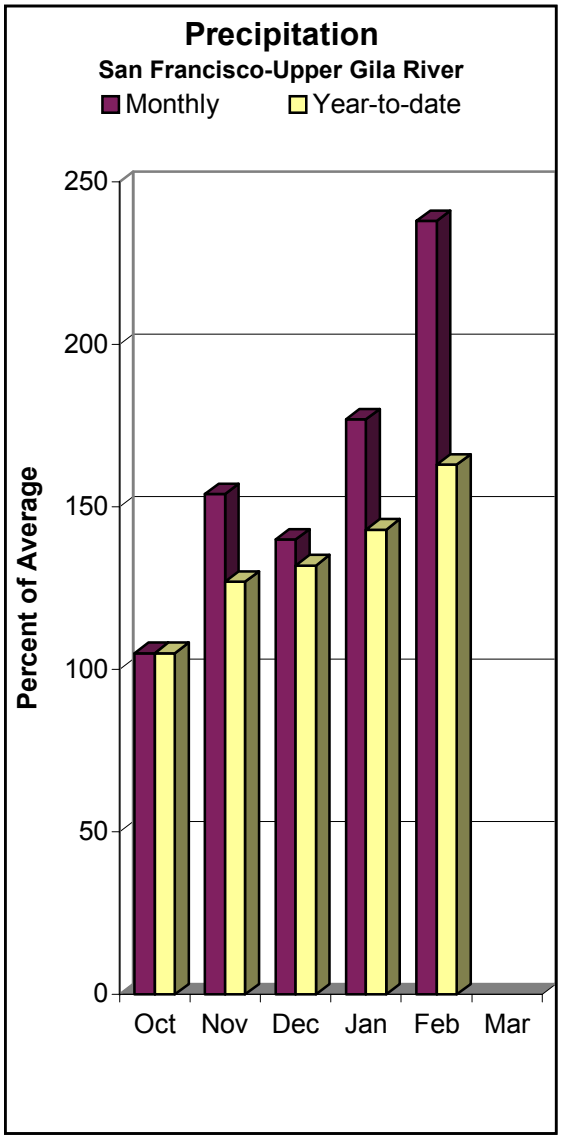
Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
VERDE RIVER BASIN	10	200	152
SAN FRANCISCO PEAKS	3	274	236

SAN FRANCISCO - UPPER GILA RIVER BASIN as of March 1, 2005

Much above median streamflow levels are forecast for the basin. In the San Francisco River, at Clifton, the forecast calls for 214 % of median streamflow levels through MAY, while in the Gila River, near Solomon, the forecast calls for 191 % of median streamflow levels through MAY. At San Carlos Reservoir, inflow into the lake is forecast at 252 % of median through MAY.

At San Carlos, reservoir storage stands at 381,521 acre-feet, while snow survey measurements show snowpack levels to be 160 % of the 30-year average.





SAN FRANCISCO - UPPER GILA RIVER BASIN
Streamflow Forecasts - March 1, 2005

Forecast Pt / Forecast Period	<=== Drier === Future Conditions === Wetter ===> Chance of Exceeding * 90% (1000AF)	70% (1000AF)	50% (1000AF)	50% (% MED.)	30% (1000AF)	10% (1000AF)	30 Yr Med (1000AF)
Gila River at Gila							
MAR-MAY	45	64	80	235	97	126	34
Gila River nr Virden							
MAR-MAY	48	77	100	213	126	170	47
San Francisco River at Glenwood							
MAR-MAY	19.7	33	45	274	59	82	16.4
San Francisco River at Clifton							
MAR-MAY	39	67	90	214	117	163	42
Gila River nr Solomon							
MAR-MAY	96	153	200	191	255	345	105
MARCH			110	208			53
San Carlos Reservoir inflow							
MAR-MAY	79	119	160	252	187	245	64

* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.
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(2) - The value is natural volume - actual volume may be affected by upstream water management.

SAN FRANCISCO - UPPER GILA RIVER BASIN
Reservoir Storage (1000AF) End of February

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
SAN CARLOS	875.0	381.5	27.2	461.4
PAINTED ROCK DAM		NO REPORT		

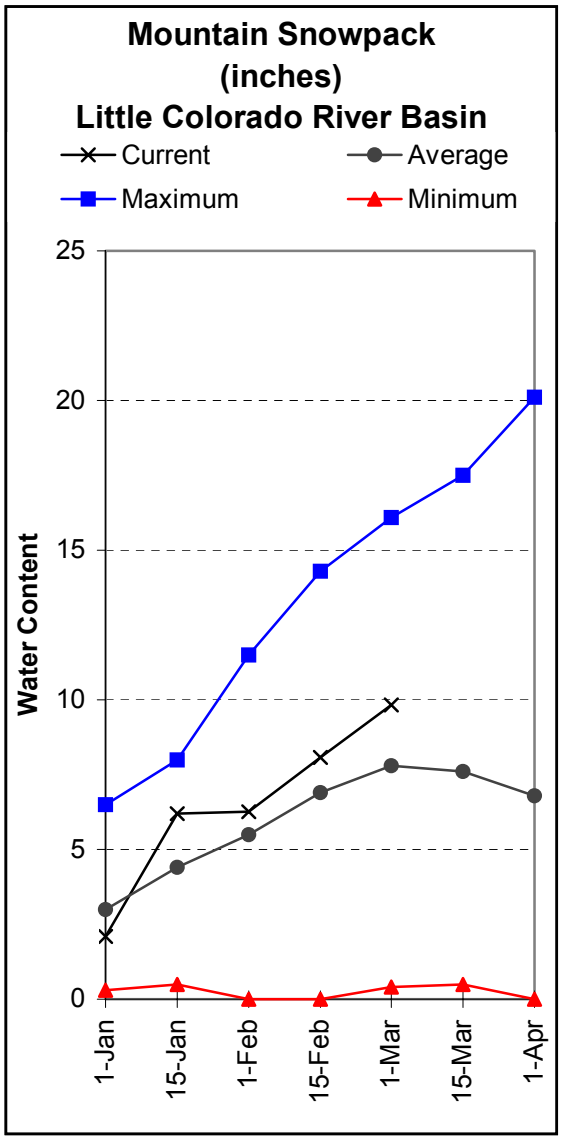
SAN FRANCISCO - UPPER GILA RIVER BASIN
Watershed Snowpack Analysis - March 1, 2005

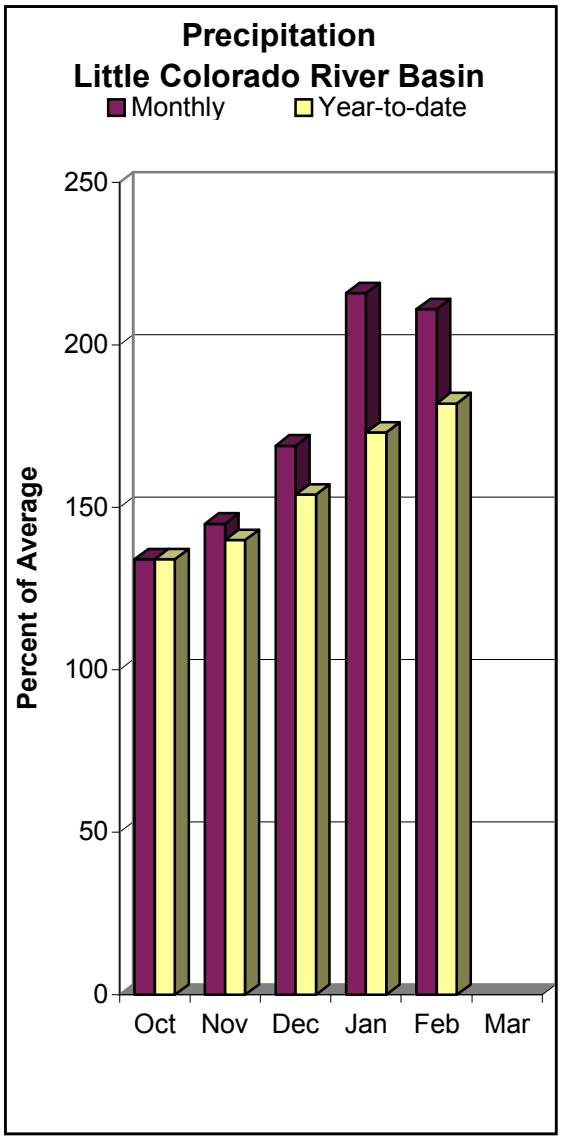
Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
SAN FRANCISCO - UPPER GILA R	11	245	160

LITTLE COLORADO RIVER BASIN as of March 1, 2005

Much above median streamflow levels are forecast for the basin. In the Little Colorado River, at Lyman Lake, the forecast calls for 291 % of median streamflow levels through JUNE, while at Woodruff, the forecast calls for 296 % of median streamflow levels through MAY.

Snowpack levels along the southern headwaters of the Little Colorado River, and along the Central Mogollon Rim, were measured at 126 % and 132 % of the 30-year average, respectively.





LITTLE COLORADO RIVER BASIN
Streamflow Forecasts - March 1, 2005

Forecast Pt / Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions — Chance of Exceeding * — 50% (1000AF)	50% (% MED.)	=== Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Med (1000AF)
Little Colorado River abv Lyman Lake							
MAR-JUN	9.50	14.80	18.30	291	23.99	32.01	6.30
Rio Nutria nr Ramah							
MAR-MAY	1.19	2.50	3.60	133	5.00	7.30	2.70
Ramah Reservoir inflow							
MAR-MAY	0.60	1.27	2.00	134	2.80	4.50	1.49
Zuni River abv Black Rock Reservoir							
MAR-MAY	0.13	0.63	1.18	133	1.90	3.30	0.89
Little Colorado River at Woodruff							
MAR-MAY	3.88	5.44	6.50	296	7.56	9.10	2.20
Blue Ridge Reservoir inflow							
MAR-MAY	15.9	21	25	195	29	36	12.8
Lake Mary inflow							
MAR-MAY	3.88	6.19	8.20	200	10.60	14.91	4.10

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LITTLE COLORADO RIVER BASIN
Reservoir Storage (1000AF) End of February

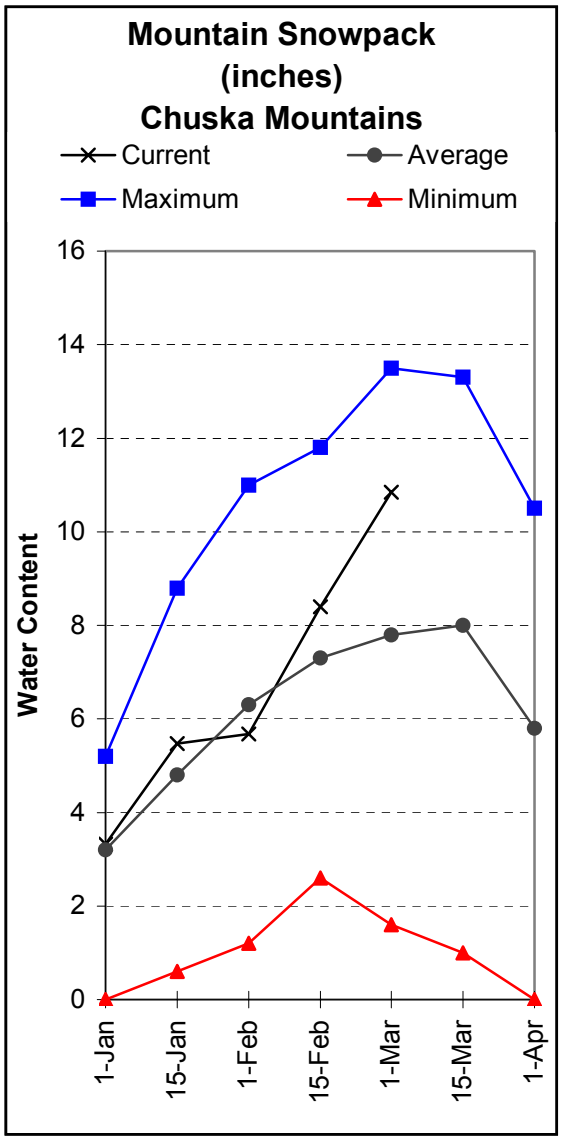
Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
LYMAN RESERVOIR	30.0	4.9	2.2	15.4
SHOW LOW LAKE	5.1	6.2	3.2	3.7

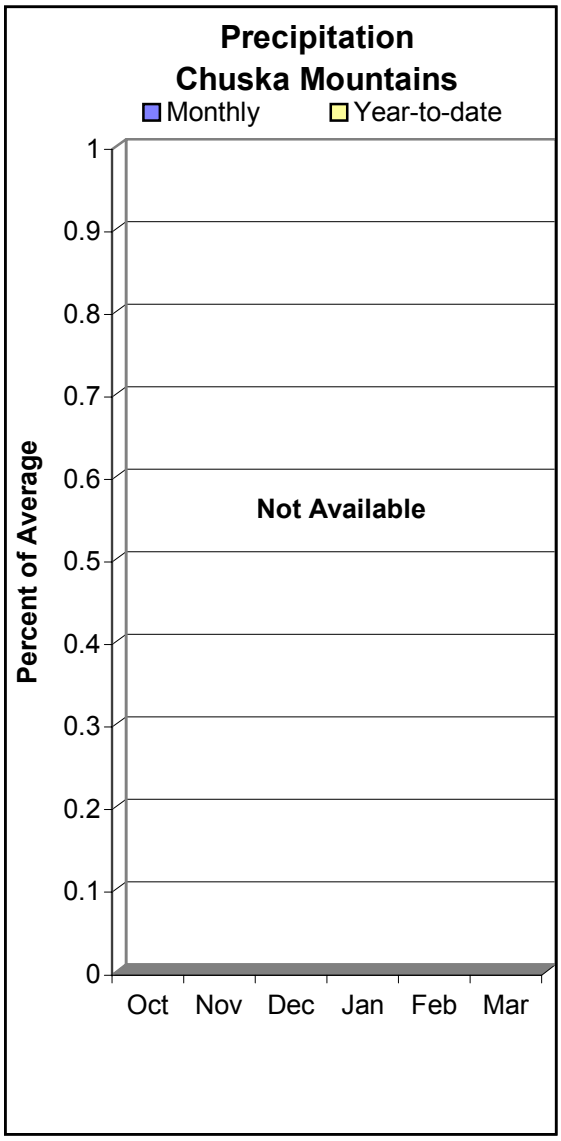
LITTLE COLORADO RIVER BASIN
Watershed Snowpack Analysis - March 1, 2005

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
LITTLE COLORADO - SOUTHERN H	9	203	126
CENTRAL MOGOLLON RIM	4	193	132

CHUSKA MOUNTAINS as of March 1, 2005

Snow survey measurements conducted by staff of the Navajo Tribe show the Chuska snowpack to be 139 % of average, while much above average streamflow levels are forecast for Captain Tom Wash, Wheatfields Creek, and Bowl Canyon Creek through springtime.





CHUSKA MOUNTAINS
Streamflow Forecasts - March 1, 2005

Forecast Pt / Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions — Chance of Exceeding * — 50% (1000AF)	50% (% AVG.)	=== Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
Captain Tom Wash nr Two Gray Hills							
MAR-MAY	0.40	2.90	4.50	159	6.10	8.60	2.83
Wheatfields Creek nr Wheatfields							
MAR-MAY	0.80	3.30	5.00	172	6.70	9.20	2.90
Bowl Canyon Creek abv Assayi Lake							
MAR-MAY	0.26	1.12	1.70	170	2.30	3.10	1.00

* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

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(2) - The value is natural volume - actual volume may be affected by upstream water management.

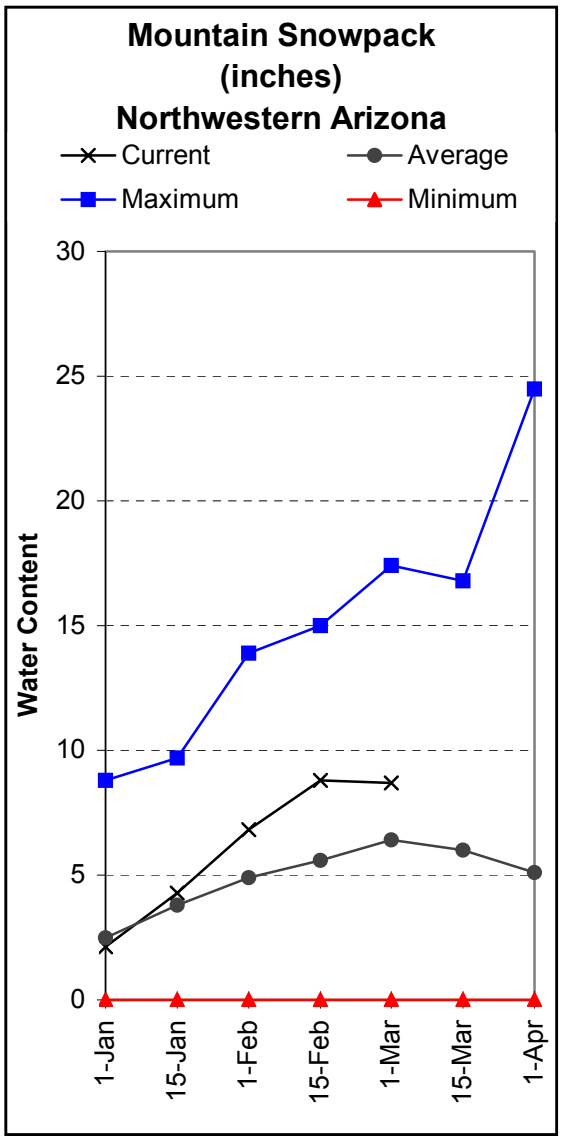
CHUSKA MOUNTAINS
Watershed Snowpack Analysis - March 1, 2005

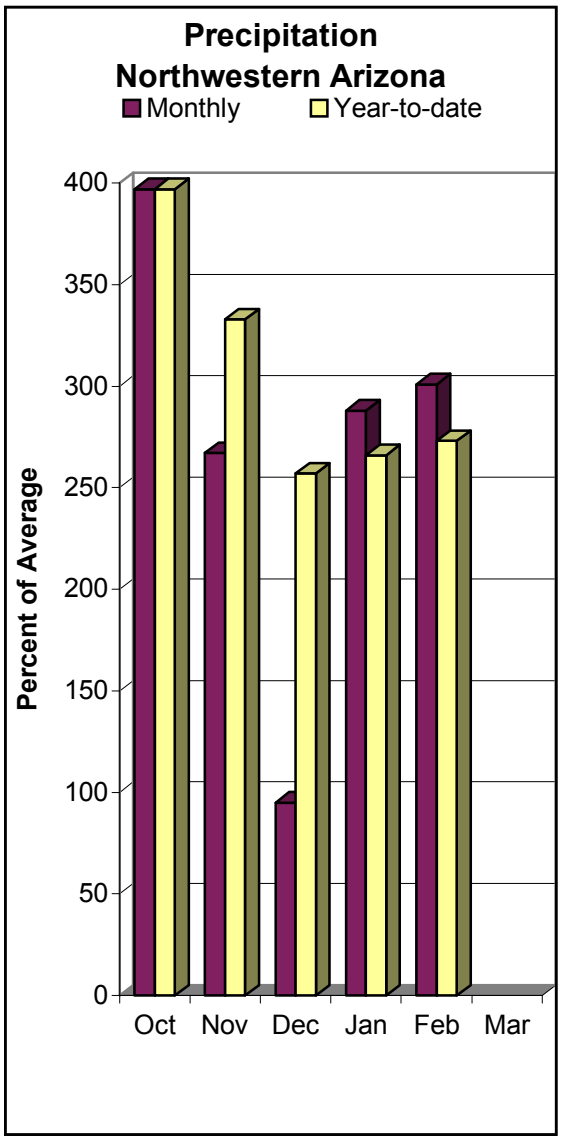
Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
CHUSKA MOUNTAINS	7	168	139
DEFIANCE PLATEAU	2	72	64

NORTHWESTERN ARIZONA as of March 1, 2005

On the Colorado River, inflow into Lake Powell is predicted at 108 % of average for the forecast period APRIL-JULY, while at Littlefield, the Virgin River is forecast at 277 % of average for the forecast period APRIL-JULY.

At the Grand Canyon, snow survey measurements conducted by the National Park Service show the snowpack to be at 136 % of the 30-year average.





NORTHWESTERN ARIZONA
Streamflow Forecasts - March 1, 2005

Forecast Pt / Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions — Chance of Exceeding * — 50% (1000AF)	50% (% AVG.)	=== Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
Virgin River at Littlefield							
APR-JUL	151	170	205	277	230	260	74
Lake Powell inflow							
APR-JUL	5700	7430	8600	108	9770	11500	7930

* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

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NORTHWESTERN ARIZONA
Reservoir Storage (1000AF) End of February

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
LAKE HAVASU	619.0	613.4	556.5	552.4
LAKE MOHAVE	1810.0	1722.9	1715.6	1675.1
LAKE MEAD	26159.0	15739.0	15404.0	22122.0
LAKE POWELL	24322.0	8265.0	10569.0	18236.0

NORTHWESTERN ARIZONA
Watershed Snowpack Analysis - March 1, 2005

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
GRAND CANYON	2	195	136

S N O W S U R V E Y D A T A

MARCH 1, 2005

SNOW COURSE	ELEV.	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 71-00
ARBABS FOREST (AK)	7680	2/28	2	.8	1.8	2.1
BAKER BUTTE SNOTEL	7330	3/01	22	7.7	4.9	5.9
BAKER BUTTE #2	7700	3/02	46	16.0	6.6	12.3
BALDY SNOTEL	9220	3/01	37	11.3	5.8	8.0
BEAVER HEAD	8000	2/28	5	1.4	2.9	2.9
BEAVER HEAD SNOTEL	7990	3/01	19	6.3	3.7	3.0
BEAVER SPRING	9220	3/01	42	13.5	6.9	9.7
BRIGHT ANGEL	8400	3/01	47	17.5	7.5	10.9
BUCK SPRING	7400	2/28	2	0.8	0.8	3.8
CHALENDER	7100	3/01	4	1.6	0.5	3.3
CHEESE SPRINGS	8600	3/01	21	6.3	3.6	5.9
CORONADO TRL SNOTEL	8400	3/01	13	7.2	2.8	3.3
CORONADO TRAIL	8350	2/28	11	3.9	1.3	3.0
FLUTED ROCK	7800	3/01	11	2.8	3.2	3.5
FORT APACHE	9160	3/01	39	11.5	4.6	7.9
FORT VALLEY	7350	2/28	14	5.4	0.6	2.6
FRY SNOTEL	7220	3/01	32	13.4	7.1	6.8
GRAND CANYON	7500	2/28	2	0.6	1.8	2.4
HANNAGAN MDWS SNOTEL	9020	3/01	58	19.0	9.3	11.7
HAPPY JACK	7630	2/28	19	7.0	3.3	4.8
HAPPY JACK SNOTEL	7630	3/01	29	11.5	5.9	6.1
HEBER SNOTEL	7640	3/01	-	6.6	3.3	5.0
LAKE MARY	6930	2/28	8	4.4	0.8	3.3
MAVERICK FORK SNOTEL	9200	3/01	48	14.6	6.5	10.2
MORMON MTN SNOTEL	7500	3/01	29	11.3	6.9	6.7
MORMON MT. SUMMIT #2	8470	3/02	57	21.2	7.9	13.5
NEWMAN PARK	6750	2/28	8	3.3	2.7	2.5
NUTRIOSO	8500	2/28	4	0.6	1.2	1.8
PROMONTORY SNOTEL	7900	3/01	47	17.4	9.9	12.9
SNOW BOWL #1 ALT.	10260	2/28	84	26.6	10.0	12.3
SNOW BOWL #2	11000	2/28	112	36.6	11.4	17.2
SNOWSLIDE CYN SNOTEL	9750	3/01	106	35.5	14.6	12.4
TSAILE CANYON #1	8160	3/01	24	8.9	5.6	6.1
TSAILE CANYON #3	8920	3/01	38	12.3	8.0	8.7
WHITE HORSE SNOTEL	7180	3/01	14	5.9	3.3	5.3
WILDCAT SNOTEL	7850	3/01	8	3.2	3.3	4.4
WILLIAMS SKI RUN	7720	3/01	36	12.3	7.0	8.9
WORKMAN CREEK SNOTEL	6900	3/01	4	1.4	5.1	5.3

Issued by

Bruce I. Knight
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

David L. McKay
State Conservationist
Natural Resources Conservation Service
Phoenix, Arizona

USDA-NRCS
230 N. First Avenue, Suite 509
Phoenix, AZ 85003-1706
http://www.az.nrcs.usda.gov